

### RTFB Noise Model and Simulator

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May 9, 2012

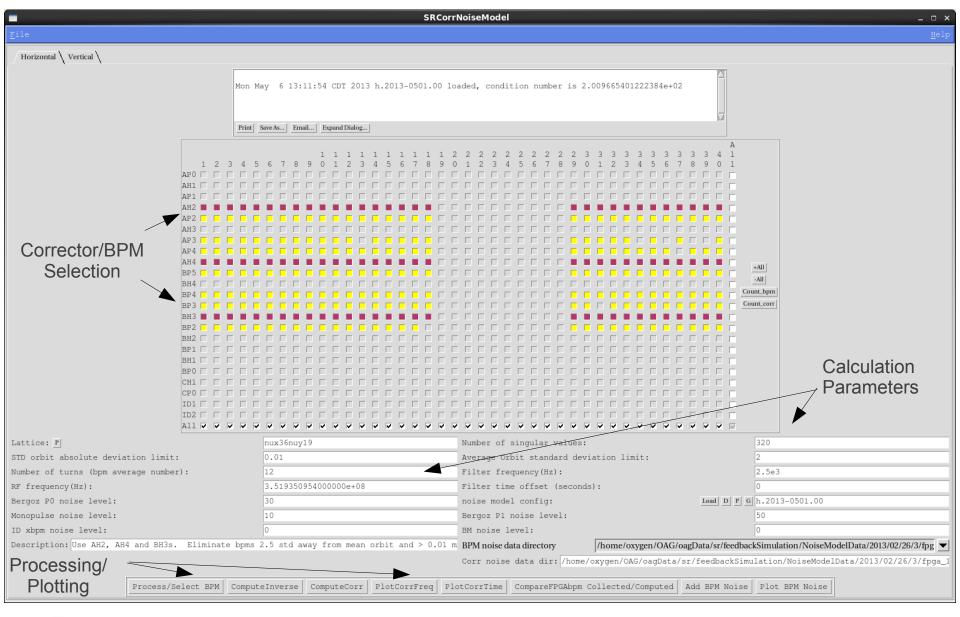


### **Noise Model**

- Uses 1, 6 or 12 second FPGA bpm data to generate simulated beam motion:
  - Computes corrector drive settings using a user specified machine inverse response matrix
  - Takes computed corrector drives and a forward response matrix to compute beam position at every bpm in the machine for use in the feedback simulation
- Uses existing real-time feedback (RTFB) system software configuration tools
  - Create inverse response matrix to compute corrector drives
  - Can add arbitrary amounts of additional bpm noise
  - Can use a subset of full time-domain bpm data sets for faster processing
  - Can filter out bad bpms based on large offset or data set STD
- FPGA (BSP-100) bpm system upgrade due to be completed this year



# **Noise Model GUI**





### **Simulator**

- Uses output time-domain beam position from the noise model
- Uses existing real-time feedback (RTFB) system software configuration tools
  - Create inverse response matrix to compute corrector drives
  - Can load real machine orbit correction bpm/corrector configurations
  - Provides plotting FFT ratio (with, without feedback), FFT, reverse integrated PSD and PSD
- Uses matlab to apply corrector model + PI regulator (Corrector model derived from frequency domain measurements) to get new corrector drive settings
- Updated bpm positions are derived by multiplying a forward response matrix by the matlab computed corrector drives
- Add additional capabilities:
  - Simulate correctors of various flavors (slow and fast)
  - Simulate various flavors of bpms (Bergoz, monopulse, Libera)
  - Add weighting of various families of correctors/bpms



## Simulator GUI

